



Energy Conservation Fact Sheet

Energy Saving Tips for Industrial and Commercial Buildings

Introduction

Energy is a significant and growing cost for most businesses. A review of how energy is used in buildings and then targeting improvements in equipment and procedures can lead to big cost savings. Furthermore, many corporate and government programs now strongly encourage energy conservation. The purpose of this fact sheet is to provide examples of energy saving tips for the general categories of building energy use that apply to most facilities. (Potential savings in direct process uses, common to heavy industry, can be found in OTA's fact sheet "Overview of Energy Efficiency Techniques and Resources".)

Facility Energy Use	Low	High
Heating: Process and Space	25%	35%
Cooling: Process and Space	1%	7%
Machine Drives and Fans	3%	11%
Lighting	1%	22%
Office Equipment	1%	7%

Businesses vary greatly in size and purpose, and this will be reflected in the proportionate energy consumption for each category of end use. The accompanying table is derived from national surveys¹ of industrial and commercial facilities. Most Massachusetts manufacturers, with a few exceptions, have energy uses within the ranges of this table. A manufacturer of basic materials would have proportionately more process heating and an assembly facility would have more space heating, lighting, etc. A large facility from heavy industry may have large boilers and even electrical cogeneration while a smaller facility in one of the light industries

may have proportionately more energy use for auxiliary food services, domestic hot water, etc.

Devising an energy strategy with the greatest potential savings involves identifying the major energy end uses within the facility. Capital costs and operating costs are also needed for ranking various conservation measures. Note that the payback periods will be affected by hours of operation and load profiles. Avoided peak demand surcharges and other energy pricing variability can be important in planning your energy strategy.²

Energy Conservation

Many criteria can be used in decisions whether to install energy-saving equipment or implement new procedures. The most frequently considered are total costs, rate of return, ease of implementation, and certainty of the desired outcome. The following four categories are examples of how your facility can make changes to achieve energy conservation.

HVAC

A big category for light industrial operations is HVAC. Waste heat from processes, lighting, air compressors, etc. can contribute in winter but may not be well distributed. Waste heat at some facilities can create additional cooling loads not only in summer, but to a lesser degree in the other seasons as well. Consider the viability of combined heat and power for your facility. (<http://www.northeastchp.org>)

- Waste heat from compressors can frequently be captured for space heating or other uses.
- Supply air for the compressors and boilers should be from the outside, not indoor air.
- Seal leaks and increase insulation, at least up to recommended R-values.
- Add economizers to the A/C system (a useful technique except on hot, humid days).
- Identify and correct unwanted drafts and unwanted air movement from one area to another.
- Use ceiling fans where appropriate.
- Adjacent rooms that are maintained at different temperatures should be separated by doors or flexible transparent barriers.
- Heating and cooling ducts should be insulated.
- Use automatic controls such as programmable thermostats, time clocks, bypass timers, weather sensors, and activity sensors, where appropriate.
- Areas of building prone to solar heat gain should be shaded in summer and exposed in winter.
- Thermostats should be set cooler in winter and warmer in summer.

Additional Energy Conservation Services

Many electric and gas utilities provide financial assistance for energy audits and energy efficient equipment. Web links to many of these can be found on the OTA Energy Web Page <http://www.mass.gov/envir/ota/reources/energyconserv.htm>

1. *Energy Information Administration: U.S. Department of Energy* (<http://www.eia.doe.gov/emeu/cbecs>)
2. *For advisories on variable pricing and procurements see* <http://www.mass.gov/doer>

Hot Water

Hot water, depending on the business, may or may not be a large percentage of facility energy use. It may be significant for facilities providing food services or requiring operating personnel to shower on-site.

- Do not overheat hot water beyond your needs or local codes.
- Insulate hot water lines, especially those nearest the tank.
- Install low flow sprayers at point-of-use.
- Install heat recovery systems where practical.
- If using an electric water heater, consider using natural gas instead.
- To keep sediment from building on heat transfer surfaces, drain and flush the tank every 6 months.
- Consider using a solar heater for the bulk of your hot water requirements.

Lighting Design

Energy efficient lighting starts with efficient lighting design. Often people work in older spaces that were designed for different tasks or a different layout. (See "Lighting Tune-up" and "Lighting Upgrades": <http://www.energystar.gov>.)

- Evaluate the design of the general and task lighting for the work being done in the area.
- Consider lighting that could be turned off in overlit areas or occupancy sensors for areas of infrequent use.
- Replace mercury vapor lamps with super T8 or high output T-5 fluorescents, or other more efficient lighting.
- Have fixtures and lamps cleaned annually or as necessary to maintain light output.
- Upgrade lighting efficiency with retrofit kits or total replacement.
- Consider controls to turn off lights near outside walls that get natural daylighting.
- Use energy efficient lighting design and equipment for outside (e.g. high pressure sodium with timers adjusted for season).
- Disconnect ballasts from delamped fixtures.
- Use electronic, not magnetic ballasts.

Energy Efficiency Programs for Buildings

ENERGY STAR® is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy helping businesses to save money and protect the environment through energy efficient products and practices. ENERGY STAR® offers a proven energy management strategy that helps in measuring current energy performance setting goals, tracking savings, and rewarding improvements. EPA has an energy performance tool where an operator can enter energy information from a building and the tool will calculate the efficiency of that building. More information on ENERGY STAR® is found on the program's website at: <http://www.energystar.gov>.

The U.S. Green Building Council (USGBC) has created a Leadership in Energy and Environmental Design (LEED) Green Building Rating System™ which is a nationally accepted benchmark for the design, construction, and operation of high performance green buildings. The LEED rating system provides the building industry with credible standards for what constitutes a green building. Energy efficiency is one of the five key areas where credit for performance is given. LEED provides business owners and operators with the tools they need to have an immediate and measurable impact on their buildings' performance. More information on LEED buildings is found on the USGBC website at: <http://www.usgbc.org>. (See "Green Building Rating System for Existing Buildings.")

The Office of Technical Assistance and Technology (OTA) has developed a series of fact sheets on Resource Conservation practices and issues. To see the other fact sheets please visit: http://www.mass.gov/envir/ota/publications/fact_sheets.htm. OTA is a non-regulatory office within the [Executive Office of Energy and Environmental Affairs \(EEA\)](http://www.mass.gov/envir/ota) that provides a range of non-regulatory assistance services to help businesses cut costs, improve chemical use and energy efficiency, and reduce environmental impact in Massachusetts. For further information about energy efficiency and renewable energy, or about OTA's technical assistance services, contact:

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